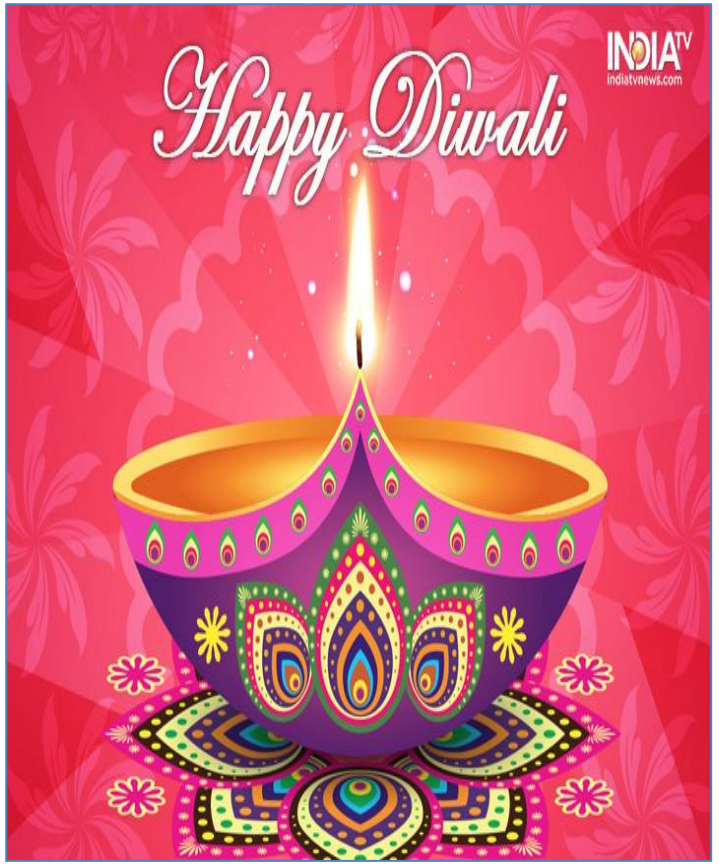
AKP Diwali Special Issue (No.2 of 2021)



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Also kindly excuse me for my typo errors ,if any

Complied By
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ME(Elect)
Date: 10/11/2021

1. Recent IMP Happenings in Power Sector

- AI Power Consumption rises by 4.8% to 114.37 BU in Oct 21
- IEX Power trade volume rises 36% in Oct 21 to 9165 MU (Due to domestic coal shortage), MOP Notice dated 22/10/2021
- Power Exchang of India Ltd (PXIL) launched ESCerts trading on each Tues day from 26th Oct 2021
- MOP proposes amendments in EC Act 2001 to boost RE: A proactive step
- Nepal sells surplus electricity in India's PEX market from 3rd Nov 2021
- Inteterting news Profits of IPPs/CPU Cos going up in Q2 of FY 21-22 & Govt Discoms are in loss
- GUJ VNL to buy power at revised tariff from TATA PowerMundra & Adani Power Mundra (Rs 4.50 instead of Rs 2.50 PU) till end Dec 21: A decision taken by Guj Govt in 1st Week of Nov 2021

AI Consumption rises by 4.8% to 114.37 BU in Oct 21

- **AI Power consumption grew by 4.8% in Oct to 114.37 BU, indicating a good recovery, amid coal shortages at Gen plants. Oct 20 consumption stood at 109.17 BU & in Oct 2019, it was 97.84 BU.**
- **During Oct 21, Max peak Demd met (in a day) stood at 174.60 GW, 2.7% higher than 169.89 GW in Oct 20**
- **In 135 power plants with over 165 GW Gen capacity, Coal stock was 10.08 MMT enough for 6 days (1.79 MMT/day) as on 29 Oct, compared to 7.96 MMT for 4 days on 1st Oct 2021**
- **Power consumption in Sept 21 was 112.43 BU mainly due to delayed monsoon (heavy rains). In Sept 20 it was 112.24 BU, higher than 107.51 BU in Sept 2019.**

Rise in Consumption (CY 2021 vs CY 2020):

- **March: 120.63 BU/ 98.95 BU (22% Growth) .**
- **May: 108.08 BU / 102.08 BU (6.6% growth)**
- **June: 114.48 BU/ 105.08 BU (9% Growth)**
- **July: 123.72 BU / 112.14 BU (10.3% Growth)**
- **AUG: 127.88 BU/ 109.21 BU (17% Growth)**

IEX Power trade volume rises 36% in Oct 21

- **Power trading at IEX rose to 9165 MU in Oct 21 from 6743 MU in Oct 20**
  - Day Ahead Market (DAM) achieved 6568 MU volume in Oct 21 (19.4% Y-O-Y growth).

AVG monthly price in IEX was Rs 8 PU.

  - In 1st fortnight, AVG price was Rs 12 PU (Avg of 96 values/day for 15 days: 1440 values)
  - 2nd fortnight was Rs 4.1 PU (due to various supply-side interventions initiated by Govts such as improved domestic coal availability & prompt intervention by Railways to enhance supply of coal to THM plants).
  - In fact in Oct last week, power price further dropped to Rs 3.4 PU.
  - Term Ahead Market (TAM) comprising intra-day, contingency, daily & weekly contracts traded 225 MU during Oct 21,

- **RTC market traded 1999 MU volume & saw a significant 145% YoY volume growth with AVG monthly price at Rs 6.91 PU.**
- **Green Term Ahead Market (G-TAM) achieved 347.7 MU volume, registering a significant 67% YoY growth.**
  - Green day-ahead market (GDAM) achieved 24.8 MU volume in the first six days since 24th Oct 2021 at weighted AVG price of was Rs 3.8 PU.
- **IEX commenced trade in Energy Saving Certificates (ESCerts) under PAT–II scheme on Oct 26, 2021. In the first trade, it accomplished trade of 43,409 ESCerts . The trade will take place every Tuesday.**

- All India Power Engineers' Federation (AIPEF) on 19Oct demanded an immediate meeting of Forum of Regulators (FOR) to cap power prices at PEXs, alleging black marketing by private operators during on-going coal shortage crises, demanded that Expert Committee be constituted to fix responsibility for Coal crises & evolve ways & means to deal with such situations in future
- AIPEF said as the coal shortage leading to a spike in energy rates, it was necessary for CERC/SERCs to immediately intervene & impose price caps to prevent excessive profiteering by IPPs & also ensure that unberable burden is not put on Dicsom consumers. Discoms are constrained to purchase high-cost power to limit the power cuts (load shedding)
  - Present instances of exploiting shortage by raising the rates to the range of Rs 8-20 PU in PEX must not be allowed . As per Sec 62 (1) of EA 2003, it is the duty of ERCs to impose price caps
- AIPEF has also expressed its concern about closure of UMPP of TATA & ADANI at Mundra which were running on imported coal & has nothing to do with present Dom coal crises

Power prices see price correction at IEX on improved coal supplies, onset of winter season (30/10)

- Power Prices in day-ahead market (DAM) & Real-time market (RTM) on IEX witnessed a significant price reduction in last week of Oct 21 following improved coal supplies & due to onset of Winter Season.
- Price of electricity in from 23-29 Oct 21 dropped significantly with AVG DAM market price at 3.75PU & AVG RT Market price at Rs 3.03 PU.
  - Two weeks back, these prices were above Rs 12 PU. This is due to considerable improvement in Domestic Coal availability for TPS
- Coal stock at TPS increased from 7.3 MMT (as on 12 Oct) has risen to 9.4 MMT (as on 27 OCT), which is stock for about 5 days. Onset of winters has resulted in min temps hovering around 16 degrees Celsius, leading reduction in Demd due to Air conditioners
  - AVG daily consumption has dropped to 3,579 MU in last week of Oct, from 3,864 MU in the 2nd week of Oct (7% drop). Peak Demd also reduced to 168 GW from 172 GW in 2nd week Oct (2% drop).

PXIL launched ESCerts trading from 26th Oct 2021

- PXIL commenced trading of ESCerts under **Perform, Achieve & Trade (PAT) scheme - cycle II** from 26th Oct 2021. ESCerts' are the Energy Savings Certificates issued by MOP to the **Designated Consumer under sub-section (1) of Sec-14 (A) of Energy Conservation (EC) Act 2001**
  - ESCerts is a tradable certificate for Energy Efficiency (EE) mandates under EC Act 2001. ESCerts **are transacted every Tuesday of the Week on PXIL/IEX platform.**
- ESCerts trading will take **forward & diversify amongst participa**nts the benefit of PAT Cycle-II, which has reportedly prompted savings of **13.28 million toe for India resulting in savings of Rs 30,000 CR for sustainable growth of the country**
  - By trading ESCerts PXIL seeks to serve all market participants to fulfil their **energy savings requirements**.
- PAT scheme is Regulatory instrument **to reduce Specific Energy Consumption in energy-intensive INDs,** with an associated market-based mechanism to enhance cost-effectiveness thro' **certification of excess energy savings which can be traded**
  - PAT Cycle-I included 8 sectors namely **AL, Cement, Chlor- Alkali, Fertilizers, Iron & Steel, Paper & Pulp, THM Power plants & Textile**. Under PAT cycle-II three new sectors namely **Refineries, Railways & DISCOMs were included**, So now there are 11 Sectors under PAT-II.

MOP Circular dated 22 Oct 2021 in the matter of Optimising allocation of CGS generated Power.

MOP noticed two practices being followed by State Discoms

- Some states have not drawn power from Central Generating stations (CGS)
- Some states are drawing Power from CGS & thereafter selling it to PEXs , at higher rates.

Hence it was decided that:

- States may schedule power as per PPA from any CGS & the same will be made available to them, if any quantity is not scheduled by the State, then it will be allocated by Central Govt, to some other State, which may need that power
- If any State is found to be selling power to PEX after drawing from CGS, then it would be construed that the State has surplus power & the same quanity would be reduced from the allocated power, from such State & made avialable to States which need power
- States which need power may indicate their requirement to MOP/POSOCO. Info about requirement of power would be transparently maintained on POSOCO website & updated on daily basis.
- Arrangement will be in force till 10 Nov 2021 & may be extended if required

MOP proposes Amendments in EC Act 2001 to boost RE:

- This will include provision for specifying minimum quantum of RE in overall consumption by establishments & IND units..Proposal includes defining minimum share of RE in the overall consumption by IND units. There will be provision to incentivise efforts on using clean energy sources by means of Carbon Saving Certificates. Proposed changes to the EC Act will boost the adoption of clean technologies in various sectors of economy.
- Amendments have been proposed to strengthen the institutions originally envisaged under the EC 2001.
- Proposed amendments would facilitate development of carbon market in India & prescribe minimum consumption of RE either as direct consumption, or indirect use thro' grid. This will help in reduction of fossil fuel based energy consumption & carbon emission to the atmosphere. Additional incentives in the form of carbon credits against deployment of clean technologies will result in private sector involvement in climate actions
- Provisions would facilitate promotion of green H2 as an alternate to the existing fossil fuels used by IND

(This is a welcome amendment, but clear modalities for Discoms need to be chalked otherwise there will be a conflict of interest)

Nepal to sell surplus electricity in India's PEX market (04/11)

- **Nepal will sell its surplus electricity to India at a competitive rate after GOI allowed neighbouring countries to trade its power in Indian PEX market.**
- **Nepal Electricity Authority (NEA) is now in a position to sell its surplus energy to India. NEA would be able to participate in an an auction in IEX everyday to sell power.**
  - **In 1st Phase 39 MW power (24MW from NEA-owned Trishuli HEP & 15MW Devigha HEP) has been permitted to trade on IEX. Both projects were developed with India's assistance.**
- **NEA will be exporting the power thro' 400- kV Dhalkebar-Muzaffarpur inter-country T/L.**
  - **NEA has been importing power thro' IEX at competitive rate since 30th April 2021, as per need. Now the power trade between Nepal & India has entered a new phase.**
- **Nepal became an energy surplus country, after 456MW Upper Tamakoshi HEP came into full operation in Aug 21.**
  - **According to NEA, Nepal has surplus power even during peak hours, (1900-2000). Nepal's Peak Demd stands at 1,500MW. Nepal is currently producing 2,000 MW, of which 1,900MW is generated from HEP projects**

Profits of IPPs/CPU Cos going up in Q2 of FY 21-22

Torrent Power net profit up 82% at Rs 367 CR in Sept quarter:

- Mainly due to higher Revenues. Its net profit stood at Rs 202 CR in Q2 of FY 21, TTL income increased to Rs 3,684 CR from Rs 3,166 CR in Q2 of FY 21
  - Torrent has an aggregate iC Gen of 3,879 MW, comprising 2,730 MW, gas based, 787 MW RE & 362 MW of coal-based capacity.
  - Torrent distributes nearly 14.5 BU to over 3.71 Million customers in Ahmedabad, Gandhinagar, Surat, Dahej SEZ & Dholera SIR in Guj; Bhiwandi, Shil, Mumbra - Kalwa in Maha & Agra in UP.

NTPC Q2 net profit rises 6% to Rs 3,691 CR

- NTPC's Net profit was at Rs 3,691 CR in Q2, mainly on account of high revenues, compared to s 3495 CR in Q2 of FY 21
  - TTL income of NTPC stood at Rs 33,096 CR in Q2 of FY 21-22, as against Rs 28,678 CR in Q2 of FY 21 NTPC's Gross power Gen rose to 74.81 BU in Q2 from 67.67 BU in Q2 of FY 21
  - NTPC's PLF rose to 69.58% in Q2 of FY 2021-22 from 64.27% in FY 2020-21. NTPC got 43.39 MMT Dom coal supply in Q2 of FY 21-22, as against 38.21 MMT in Q2 of FY 21. Imported coal supply also rose to 0.42 MMT in Q2 from 0.15 MMT in Q2 of FY 21.
  - AVG tariff of NTPC stood at Rs 3.82 PU during April to Sept 21. It was at Rs 3.86 per unit in H1 of FY 20-21

Tata Power Q2 profit up 36% at Rs 506 CR

- Net profit of TPC in Q2, FY 2020-21 was Rs 371CR , which rose to Rs 506 CR. TTL income stood at Rs 10,187 CR in this Q2 as against Rs 8,442 CR in Q2 of FY 20-21. Consolidated profit after tax was up 36% due to savings in finance cost & better performance in RE business.
  - Tata Power Group's revenue was up 13% at Rs 9,502 CR as compared to Rs 8,428 CR in Q2 of 21. This is mainly due to expanded operations in Odisha DISCOMs, higher project execution in Solar EPC Business
- Clean energy currently makes up 32% of Tata Power & portfolio which is expected to touch 80% by 2030. Tata power has reached a significant milestone of deploying 1000 EV Public charging points, across 180 cities in India. Tata Power continue to strengthen solar pumps, solar Roof Top & Solar Microgrids businesses across India

JSPL: consolidated net profit of Rs 2,584 CR for Q2 of FY 22

- Naveen Jindal-led Jindal Steel & Power (JSPL) reported a consolidated net profit of Rs 2,584 CR for Q2 of FY 21-22 as against Rs 837 CR in Q2 of FY 20-21. (308% rise)
  - Net sales of JSPL in Q2 of FY 22 stood at Rs 13,611 CR, up 67% from Q2 of FY 21 because of higher volumes & strong realisations.

Adani Green Energy Q2 : Net profit jumps nearly six-fold to Rs 100 CR:

- Net profit of Adani Green was Rs 17 CR in Q2 of FY 21, which went up to Rs 100 CR in Q2 of FY 22. Adani Green's TTL income stood at Rs 1,411 CR in Q2 of the current FY as against Rs 718 CR in Q2 of FY 20-21.
- Increase in sale of energy was backed by capacity addition of 2,610 MW & improved CUF of Adani's Solar/wind installations.
- RE Sale grew by 61% to 1,901 MU in Q2 of FY22 from 1,182 MU in Q2 of FY 21
  - Solar energy sales grew by 41% to 1,430 MU in the Q2 of FY 22 from 1,017 MU in Q2 of FY 21. Wind energy sales grew by 185% to 471 MU from 165 MU during the same period

RLYs: 7.6% rise in freight movement, revenue up 18.19% :

- Total loading this year was 117.34 MMT, which is 7.63% higher compared to loading for the same period (109.01 MMT) in 2020.
- During this period Indian Railways earned Rs. 12,311 CR from freight loading, which exceeded by 18.19% compared to last year earnings for the same period (Rs. 10417 CR).
  - Indian Railways has taken a series of initiatives in both tariff & non-tariff fields it facilitated the movement of freight trains. There was a 72% increase in AVG speed of freight trains in FY 2021-22 as compared to the last year

GUVNL to buy power from Mundra IPPs at revised tariff (Rs 4.50 instead of Rs 2.50 PU) till end Dec 21 (03/11)

- **CGPL, a subsidiary of Tata Power and Adani Power Mundra Ltd have signed PPAs with GUVNL to supply 1800MW & 1200 MW respectively from IMPORTED Coal fired THM stns at Mundra. As per the PPAs with Tata Power & Adani Power, *the fixed energy charge is less than Rs 2.50 PU***
  - **TATA & Adani recently stopped supplying power to GUVNL at the contracted rates, citing unprecedented rise in imported coal prices over last few months that have made their projects unviable.**
  - **Indonesian coal prices, which have been the main concern for imported coal fired power plants India had shot up from $80-90/MT to over $200/MT, recently**
- **In mid-Oct, when the stock of Dom coal held by AI TPS were critically low, GUJ Govt agreed to buy power from CGPL & APMuL at fixed energy charge of Rs 4.5 PU. The Nov 5 deadline has been extended to 31st Dec 2021, looking at present exigency & critical power supply position in GUJ**
  - **In Oct 2021, GUVNL purchased about 4,000MW power/day worth Rs 1,931 CR from IEX at AVG rate of Rs 9.69 PU. GUVNL had bought power worth Rs 1,035 CR from the exchange for Sept. Power bill from IEX started going down from mid-Oct, after it resumed buying directly from Tata & Adani Mundra PS**

2. IMP News Regarding RE/Solar Projects

- India installed 4.6 GW Solar projects in first half (H1) of Calendar Year (CY) 2021
- PUN: issued New Tenders of Solar PP in Oct 2021
- Rise in Custom Duty (from April 22) & taxes (GST from 5-12% from 1st Oct 21) to have an impact on rise in solar tariffs to more than Rs 2.60 PU next FY.
  - GOI already indicated that the rise in taxes & duty will be pass through for long term PPAs/PSAs
- SECI to float tender for 1,000 MWh Battery ESS system (A proactive apprach by GOI)
- Round The Clock (RTC) auction rendered pointless as RE Energy share brought down to 51% from 80% earlier

India installed 4.6 GW Solar projects in first half of CY2021

- India installed about 4.6 GW solar projects in H1 of 2021, (251% increase compared to H1 of CY2020).
- India has 52.8 GW utility-scale under development projects in H1 of 2021.
  - Adani is the leading utility-scale solar project developer
- Solar accounted for 53% of total power capacity additions in H1 of CY 2021, the highest addition for any year, so far
- In H1 of CY2021, India installed 862 MW Roof-top solar (210% increase compared to the 279 MW installed in 1H 2020)
  - Tata Power Solar had the largest RT Solar installtions in H1 of CY 2021
- LONGi Solar was the top module supplier to India in H1 of CY 2021. Market is steadily shifting to mono-crystalline technology, which accounted for almost two-thirds of the modules shipped in H1 of 2021.
  - Top five Open Access solar developers in H1 of 2021 accounted for 66% market share

Punjab going Strongly with RE purchases:

- PSPCL had signed a Power Supply Agreement (PSA) with SECI for 500 MW Hybrid (Solar + Wind) power to be available starting from Dec 21 & full capacity by end of March 22
- PSPCL has signed an MOU with CESL (JV of CPSUs) for development of 140 MW Solar PV projects at spare land of PSPCL 66 KV S/s
- PSPCL has already tied up for about 951 MW solar power from various projects
- PSPCL had floated 2 x 250 MW tenders for procurement of Solar Power from power project at anywhere in India.
  - ReNew Dinkar Jyoti Pvt Ltd has offered 250 MW power at Rs 2.33 PU.
  - SJVN Ltd has offered 100 MW Solar power at Rs 2.69 PU &
  - SAEL Ltd has offered 50 MW solar Power at Rs 2.69 PU.

Duty, taxes to lift Solar tariffs to more than Rs 2.60 PU next FY: CRISIL/ ICRA

- Solar tariffs might rise to Rs 2.6 to 2.7 PU from an all-time low of Rs 2 PU in next FY in the wake of recent increase in Goods & Services Tax (GST) on RE equipment & proposed levying Customs Duty on imported solar modules
  - This would result in project cost inflation to Rs 4.2- 4.3 CR/MW in next FY, from Rs 3.6 to Rs 3.7 CR/MW
- This will lead to solar bids to reach over Rs 2.6-2.7 PU for developers to maintain returns of 11-12%.
- Developers of already bid-out projects are expected to pass on impact of taxes & duties under the change-in-law clause.
- GOI increased GST on Solar PV Cells & Modules from 5% to 12% wef 1st Oct 2021. Total taxation on a solar project will rise from 8% to 13%.

- **It willfurther go up to 30%, when customs duty of 40% on imported solar modules kicks in from 1st April 2022.**
- **Module prices increased from 19-21 Cents/Watt in last FY to 23-24 cents/Watt in June 21 (& will further to 27-28 cents/ watt by Dec 2021), This is primarily due to increase in poly-silicon prices because of disruptions at manufacturing facilities in China. Tariffs might further increase by 15-20 PSPU because of this risk**
  - **Apart from poly-silicon, cost pressures for solar power projects are arising from the sharp jump in Steel & AL prices which are used in mounting tructures & back sheets for solar PV modules respectively**

(As a result Solar power tariff may reach Rs 2.80-3.00 Puin next FY)

- **Already about 20 GW had been bid-out but haven't found a buyer for electricity. If developers resort to aggressive bidding in a competitive market, it will likely increase the credit risk on new projects as cash flow cushion may be thinner than earlier**
  - **Developers are likely to face delays in execution owing to supply chain constraints arising due to disruptions in China.**

SECI to float tender for 1,000 MWh Battery ESS system

- **SECI is likely to float a tender in Nov 21 for installation of 1,000 MWh Battery Energy Storage System (BESS) as a pilot project following overwhelming response to expression of interest (EOI) in this regard.**
  - **Stakeholder consultation was held jointly by MOP, MNRE & SECI on Oct 28, 2021, which witnessed a huge participation from various stakeholders, ranging from battery manufacturers, system integrators & financing agencies, underscoring the fact that GOI as taken the steps in the right direction towards fulfilling the ambitious target ~~450~~ 500 GW RE capacity installations by 2030.**
- **Concerns of participants related to draft guidelines (for procurement & utilization of BESS, as a part of G/T/D assets, & with all ancillary services in tender documents were duly noted, with few of them being addressed in the meeting itself. Participants were asked to submit their queries/suggestions on draft document by writing to SECI by 7th Nov 2021**

- **India's total commissioned utility-scale RE reached 77,082 MW & & RT solar capacity 7,701 MW, on 30 June 2021, according to a recent report by Bridge to India.**
  - **While Guj, Raj & UP added the highest capacity in these 12 months. TN leads in wind IC while KAR leads in utility-scale solar installations.**
  - **Investor confidence is still downbeat because there is tremendous policy uncertainty all around & execution risks are rising,**
- **TTL annual Roof Top solar capacity addition in 12-month period between July 2020-June 2021 was 1,784 MW, a 53% y-o-y increase.**

Reasons for weathering interest by Investors in New Solar plants in various States:

- **Alarming financial situation of Discoms,**
- **Not getting of preferential tariff for solar power,**
- **Delay in getting statutory approvals,**
- **Obstacles to get credit notes from Discoms**

Iron Battery Breakthrough Could Eat Lithium's Lunch:

- World's electric grids are creaking under the pressure of volatile fossil-fuel prices & imperative of weaning the world off polluting energy sources. A solution may be at hand, thanks to an innovative battery that's a cheaper alternative to LI-Ion technology. If proved successful this may cahnge the entire scenario of BESS
- SB Energy Corp., a U.S. RE firm that's an arm of Japan's SoftBank Group Corp., is making a record purchase of the batteries manufactured by ESS Inc.

MOP: Short duration PPAs/PSAs for RE: need of times:

- MOP is proposing to gradually move away from Long Term PPAs (25 Years) & introduce Medium Term & Short Term (1-7 years) contracts in the market. A committee is set up to examine changes in PPA tenure & relevant changes in Payment Security Mechanism (PSM) & other contractual provisions.

Round The Clock (RTC) auction rendered pointless (NCE to go from 80% t0 51%):

- Last week SECI concluded auction for 2.3 GW Round the Clock (RTC) power. Tender mandates that at least 51% power shall be supplied by combination of Solar & Wind sources including Storage, while the balance may come from conventional Sources
  - *Condition was dilutated without proper reason* (from 80% to 51%) . Hence RTC RE may turn pointless

3. Fire In Ahmednagar Civil Hospital ICU

Are we ignorent, even when patients are dying?

AHMEDNAGAR CIVIL HOSPITAL ON FIRE at 1100 Hours

INTENSIVE CARE UNIT Ward AFTER FIRE AT 1330 Hours

- Eleven old aged patients died (age ranging from 58-82 yaers) after a fire broke out in the COVID-19 Intensive Care Unit (ICU) ward of Civil Hospital in Ahmednagar on Saturday 06 Nov morning (BHAU-BEEJ DAY), at about 1100 Hours. 17 patients were being treated in the ICU ward.
  - Eleven died & four injured were shifted to a nearby hospital.
- Earlier, all Hospitals in Ahmednagar Dist were directed to carry out "FIRE AUDIT". A 'fire audit' of Civil Hospital structure had been conducted, as informed by the Collector Dr Bhosale.
- CM has ordered an enquiry probe into the tragedy, & announced ₹ 5 lakh compensation for families of those who died.
- The cause of blaze, which has been extinguished by 1300 Hours, is as yet unknown, but preliminary investigations by fire Department suggest it started due to an "Electrical Short Circuit".
- Visuals show smoke pouring out of the lower floors of the hospital & also show the heart-breaking sight of doctors desperately trying to revive some of the patients who were caught in the fire

- **Those fortunate could be shifted out can be seen waiting in the courtyard. Some videos also show people slowly re-entering the ward after the fire was put out, with soot-stained walls & broken ceiling panels visible.**
- **ICU had been newly built for the express purpose of treating COVID-19 patients, & the fact that a fire had broken out of ICU was a "very serious issue.**
- **In April 2021, 14 COVID patients died, in the ICU of a Private Hospital in Virar (around 70 km from Mumbai).**
- **In March 2021 a fire in the mall at Bhandup (that housed a hospital which was given temporary permission to treat COVID-19 patients, took lives of 10 Patients.**
- ***On 8th Jan 2021 Ten newborn babies (aged 1-3 months) died after a fire broke out in the Special Newborn Care Unit of a state-run hospital at Bhandara at 0200 Hours while seven babies were rescued. Seven babies were rescued.***

In fact after Fire in Virar & Bhandup Hospitals a special issue of Power News Click on "Fire incidences in Hospitals: due to Electrical Reasons" was published on 14 May 2020 (PNC Issue No 12 of 2021).

It seems we have not lernt any lession from earlier Fires.

Care should be taken during wiring the important installations like ICU wards in Hospitals & Overloading under any circumstances should be avioded

For your quick reference, I am enclosing Conclusions drawn by me in PNC 12 of 2021 issue

Conclusions: Sudden Surge in Fire incidents in Hospitals

- Since August 2020, on Pan-India basis, in 24 (now 25) cases of hospital fires, 93 (now 104) people have died.
  - Most of the deceased were COVID-19 patients.
  - Fires are occurring even as fire checks & audits have been conducted in these hospitals
  - From August 20, Maha reported 43 deaths & GUJ reported 35. The latest incident of hospital fire was reported from GUJ's Bharuch in which 16 patients & two nurses lost their lives.
- It is observed that the main reason for majority of fire deaths during an outbreak is not the fire itself, but because of choking & suffocation that happens when one inhales toxic smoke from the dense flames emitted from burning PVC wires (which contains CO. CO2 & HCL gases)
  - In recent years, there has been a shift towards Fire Survival cables, Second major trend that is seen globally is increased usage of Low Smoke Zero Halogen (LS0H) instead of PVC Wire due to its safety hazards
- Increased Fires incidents are due to the fact that Hospitals are overstressed by rising patient load.
  - Along with fire audit, hospitals should also undergo electrical audit, also
- Before this wave, the ICUs had not been operating at full capacity, & in contrast, it is observed that ACs, ventilators & equipment being run throughout the day & night.
  - As per ideal conditions, ACs need a cooling period after running for 15 to 16 hours, which they are now not getting. There is a need for stand-by AC
  - Lack of cross-ventilation has been noted, especially in the case of ICUs so that they remain sterile.

- Resonance also causes heavy current thro' power capacitor, used for PF improvements. There is no dead short circuit but heavy currents do not activate short circuit protections.
  - Nevertheless, currents can be large enough to cause excessive heating in the associated circuits with consequential damage to the frequency of Resonance .
- Conclusions of study of 131 hopital fire incidences during 2010-2019, in nut shell:
  - Most common cause of fire accidents is Electrical short circuit. Hospitals need to prioritize periodic testing of fire-fighting systems & regular training of staff on their use.
  - Judicious placement of electrical equipment combined with oxygen monitoring devices in ICU areas is recommended.
  - Storage of flammable materials & placement of Central gas supply points should be away from the vicinity of patient care areas & always in conjunction with robust fire detection & control appliances. Hospitals should adhere to their planned capacity.
- Presence of more inflammable material in COVID hospitals during Covid Pandemic such as Sanitizer vapour & spills, more oxygen content, as well as synthetic material-made PPE kits, which adds in quicker spread of fire & leave lesser response time
- A proactive approach to fire safety is the only way to ensure fool proof safety of Electrical systems from instances of fire.

- **Hospital managements must invest & upgrade their knowledge & experience in resolving urgent & growing safety concerns on priority.**
- **This calls for addressing every root cause: *from following the right Standards in cables to improving PQ.***
  - **Proactive prevention of PQ issues in Hospitals requires much groundwork & addressing the root causes for which Regular Electrical Audit of Hospitals is a must & It is utmost neccesary to stricty comply the recommendations of Fire Audit & Energy Audit Reports**
  - **A course correction from current practices is required at every stage: from design to installation & maintenance when the facility is in operation. Following high standards & not falling for savings in upfront costs but Best Quality must be the norm.**
  - **Regular Fire Audits from strict Auditors is a must All the hard work, sacrifice & care in saving the lives of COVID patients cannot be at stake of an increased risk of electrical fire, from underlying electrical causes which are preventable.**
- **On 05/05/21 GOI has also issued a new advisory on FIRE INCIDENCES in Hospitals**
  - **IS732 is the Standard for Electrical Wiring prescribed to be followed by the National Building Code (NBC)**

Finally the Imp cause of any FIRE Accident is OVER Loading of Electrical Network (OVER CONFIDENCE & CARELESS-NESS)

- **Ultimately it is resulting into such Fire incidences, claiming innocent lives of helpless patients. We need urgently to improve the "SYSTEM'**

4. India's 2070 Net-zero emission target

PM MAKES FIVE PLEDGES

1. India will increase its non-fossil energy capacity to 500GW by 2030
2. India will meet 50%of its energy requirements from renewable energy by 2030
3. India will reduce the total projected carbon emissions by one billion tonnes from now to 2030
4. By 2030, India will reduce the carbon intensity of its economy by 45% (from a previous target of 35%)
5. By 2070, India will achieve the target of net zero

WHAT IS NET ZERO?

Net zero refers to a balance where emissions of greenhouse gases are offset by the absorption of an equivalent amount from the atmosphere. Experts see net zero targets as a critical measure to successfully tackle climate change and its devastating consequences

PLEDGES BY TOP THREE EMITTERS

CHINA: Beijing announced no new pledges on Monday. It previously pledged net zero by 2060.

UNITED STATES: The US touted domestic legislation to spend $555bn to boost renewable power and electric vehicles. It has pledged net zero by 2050.

INDIA: The country's economy will become carbon neutral by the year 2070

Hon PM Modi at COP26 Glasgow announced that India will achieve Net-zero Carbon emissions by 2070. "Net-zero" has been touted as a buzzword

Net-zero & its components:

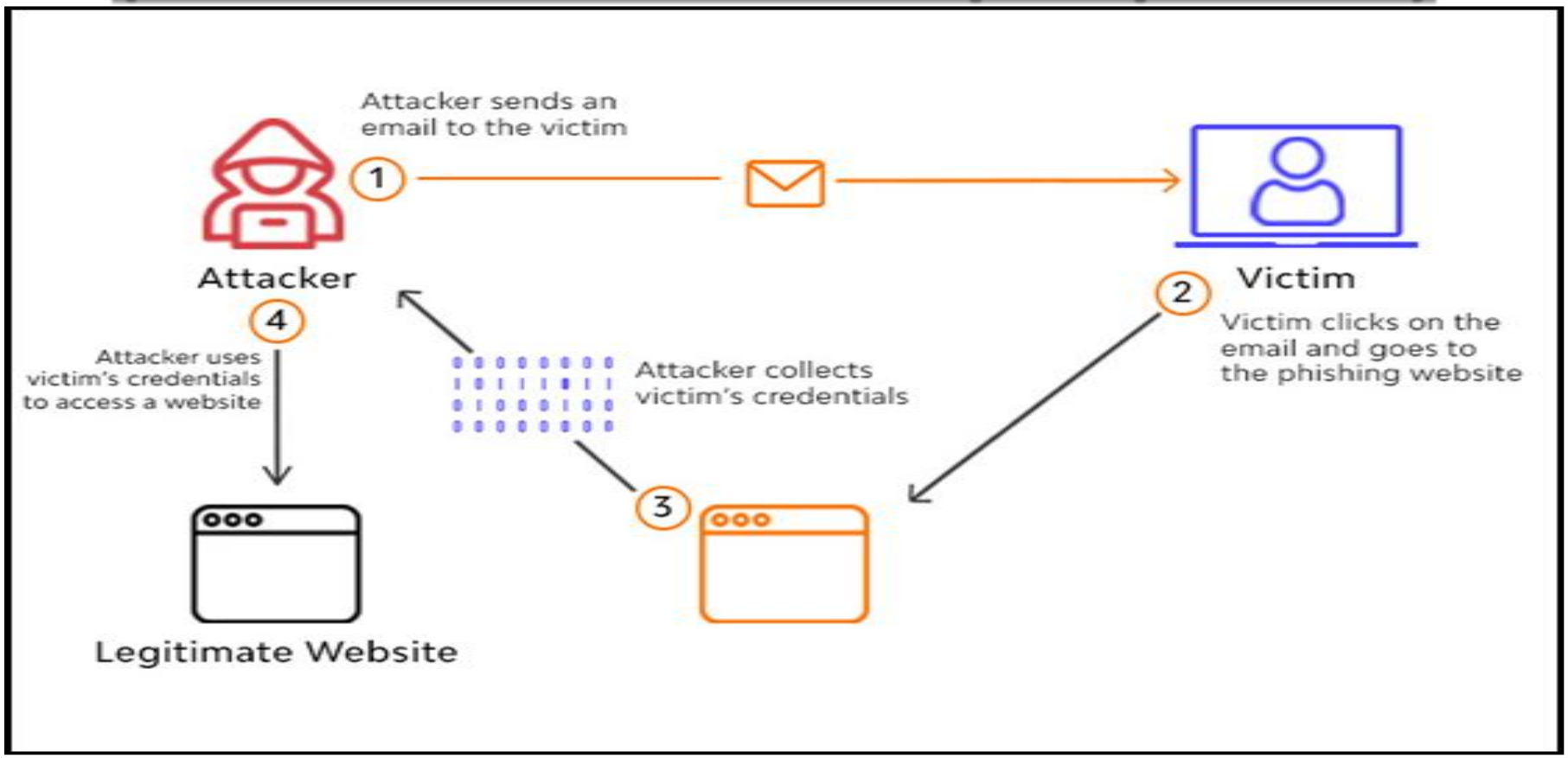
- Idea is to reach to a situation where whatever we emit, is absorbed by forests etc. & we transit to RE. Net-zero is using non-fossil fuel energy for all future demands
- First step is to reduce our energy needs considerably by gradually using Energy Efficiencient equipment & changing life style, managing the economy so that less energy is used & whatever is used is generated by Non-fossil fuel.
- Electrifying transport (EVs) has significant potential to reduce emissions
- Shifting from Coal to RE as primary source of energy will mean an orderly transition of Power Sector.
- Globally, energy sector including Electricity, Transport, & IND comprise nearly 80% of emissions. Clean energy in these sectors will take bulk of load. That's where the change will have to happen: fast, steady & progressive.

- **PM announced a IC target of 500 GW for RE in by 2030 for which we will have to quadruple rate of RE deployments in India over this decade.**
  - It will mean several Old coal plants with low efficiency & polluting should be shut down. All incremental energy will then have to come from REs alone
- **To avoid Global Temp rise, countries across the world will have to undertake drastic cuts in emissions.**
  - This can be done by absorbing or taking out emissions from the atmosphere, thro' carbon removal, either thro' planting trees which will act as a natural sink, or through direct capture of carbon emission.
- **In reality Net-Zero will bring huge social transition, when the nature of jobs in THM plants, coal mines, auto sector, etc will change.**
  - If not done well, a lot can go wrong. If the West will share technologies & commit *to low cost finance at the right time,* this opportunity can be a Game Changer for the planet If not, it will be mere rhetorics at meetings on Climate change

- India's emissions are already much lower than China
  - China & the US emit 10 & 5 Gigatonnes of CO2, respectively.
  - India, despite a population of 1.3 Bn, emits less than 3 Gigatonnes, & per capita, it's even much lower lower than the US & China
- China announced a net zero target of 2060 & is still building new coal plants. Soon, India will almost end up with no further THM plants, & all incremental Demd will be met thro' RE
- Our emissions are already low & yet we talk going to Net-Zero by 2070, one can draw many lines to it:
  - It could be going straight down or it could go up a little bit & then go down.
- *Achieving midterm goal of 500 GW RE IC by 2030 is a bit an aggressive commitment*, given India's unmet development goals, & its growth in next few decades.

Finally, Net-zero is not a figure to be attained by all countries in one year. If developed economies such as the EU & the US have a NET-ZERO target of 2050, India's target of 2070 is in line with the context, as of now.

5. PHISHING ATTACKS & CYBER SECURITY (From common user's perspective)



Let me upfront admit that I am neither an IT IT Engr, nor a Cyber Security Expert. I am an ordinary laptop user. I am just sharing some of preliminary studies Kindly excuse me for mistakes if any in my understanding .

- There is a reason why threat-actors depend heavily on phishing: this is a type of attack which targets the user rather than a device or network.

Let me tell you my story:

  - During Diwali Days, I received an email from a hacked mailer with an attachment about I getting a Doctarate Degree by merely filling an appilcation form in the attachment. The name of the Reputed University was mentioned with fake address & attachment mjght have been laced with malware. Probably the sender might have known about my unfullied dream of getting a Doctorate Degree. Fotunately I read 2/3 articles in simple language about "FISHING".

- This is a phishing attack, where social engineering is used to gain the trust of message recipient & induce recipient to perform an action prejudicial to their interests: such as opening the malicious attachment, in this example.
  - Phishing attacks are very common: 91% of cyber attacks begin with a phishing email. Phishing attacks can also impose significant costs on the victim: an attacker stole $98 million from Facebook & $23 million from Google (subsequently recovered) by impersonating employees of a vendor to send fake invoices.

How Does "Phishing" Work?

- Phishing is an old-fashioned confidence trick that has graduated to the digital world. An analysis of a phishing campaign will typically reveal:
  - Fish: A gullible victim who doesn't verify the authenticity of messages
  - Lure: A hoax message that appears to be from a trusted individual or organisation
  - Bite: The victim opens a malicious attachment, accesses a malicious link, reveals confidential info, or performs an action (such as transferring funds)
  - Catch: The attacker achieves their objective, which could range from launching a ransom ware attack to stealing intellectual property
- Phishing attacks against businesses often use email but any channel of communication can be used, such as phone, SMS, WhatsApp, & social media.

Types of Phishing Attacks:

Cyber-attackers can use phishing in different types of campaigns that target different types of users with different objectives:

- **Phishing:** This is an umbrella term used to describe social engineering that targets any user, thro messages that claim to be about topics that could be of interest to anyone or could be addressed to anyone, such as Updated COVID-19 Guidelines or Income Tax Notice

- **Spear Phishing:** Spear Phishing is a type of phishing that is customised to the user or category of users e.g., Accounts Payable Managers, who are targeted using info that is specific to their job to give credibility to hoax message. (in my case my unfulfilled dream of getting Ph D was used)
- **Whaling:** This is similar to spear phishing but is focused on high value targets (called whales because they are very big fish) such as CEOs or CFOs as those with high levels of responsibility also wield great power & a successful attack against them can be very lucrative for the attacker

There is a common thread across various methods & types of phishing: they all target the user & not a device or network, & depend on human fallibility on the part of the victim rather than the technical prowess of the attacker.

This is also why phishing attacks are preferred by attackers as a user may be persuaded to ignore or override warnings from security software & perform the action required by the attacker.

Measures To Avoid Phishing Attacks:

A business can protect its operations from being disrupted by phishing attacks by following these steps:

1. **Provide Cybersecurity Training:** Best defence against phishing is a well informed user. "Cybersecurity Training Programs" should educate users on the tactics that threat actors use & how a phishing attack can be detected.

2 Users should be suspicious if a message:

- Requires urgent action on their part but they cannot independently verify why such urgent action is required e.g., the message asks for an urgent transfer of funds for a confidential purpose that cannot be revealed to other employees
- Is from an email ID that closely resembles a corporate email ID but is not an exact match e.g., the email is supposed to be from a bank but there is a slight alteration in the domain name of the email ID compared to other emails from the same Bank
- Is unexpected or sender doesn't usually communicate about the topic discussed in email
- Has spelling or grammatical errors, or odd use of phrases that may indicate software-based translation from the attacker's native language
- Includes a link that leads to a domain that is different from where it is supposed to go e.g., message is from a vendor but the link leads to a website that isn't the vendor's website
- Has an attachment that requires macros to be enabled or has more than one extension e.g., a file with extension '.pdf.exe' is an executable masquerading as a PDF

3 Implement a Maker-Checker-Approver Process:

- A cyber-attacker may be able to convince one employee to perform an action but it is far more difficult to convince two or even three employees to perform that action; the attack can be avoided if any one of them notices a red flag

4. Deploy Endpoint Security:

- Many phishing attacks include malware or malicious links, which can be detected & blocked by enterprise cybersecurity solutions

- It is critical to ensure that all endpoints that connect to the corporate network are protected as even a single unprotected endpoint can be used by a threat actor to launch an attack

5 **Deploy Network Security:**

- Gateway security solutions, Unified Threat Management appliances to stop cyber-attacks at the network perimeter & prevent intrusion attempts

6 **Encourage Vigilance in Life Away from Work:**

- Threat actors may target employees in their personal lives, e.g., by interacting with them on social media, to launch an attack against a business.

Enterprise cybersecurity cannot protect an employee in such away-from-work situations, but an employee who is aware that they are vulnerable in their personal life can spot & stop a phishing attempt.

- Employees can also protect themselves by using cybersecurity solutions such antivirus for consumers on their personal devices

Cyber SAFETY Tips:

- S:Skip Spam/ A:Adopt Card Safety
- F-Follow password, OTP secrecy, E-Enable antivirus
- T-Think before you click, Y-Yes to cyber awareness

India's Data consumption rate highest worldwide:

Ram Sewak Sharma, CEO National Health Authority of India said at the ET Global Town-hall, organised by Economic Times on 29/X:

- **India has the highest mobile data consumption in the World at rate of about 12 GB /user/month.**
- **Today India has 1.18 Bn mobile connections, 700 Mn Internet users, & 600 Mn Smart Phones & India is adding as much as 25 Mn new smart phone users every quarter, We have a strong connectivity base today**
  - **There is a need to make connectivity more robust by ensuring deployment of fiber based networks in India, which will ensure a robust digital infrastructure.**
- **In absence of pervasive fibre connectivity, India has sufficient wireless connectivity or launching new digital initiatives since telecom service operators have moved to 4G networks with their data-first approach. All Telcos have moved onto the 4G platform.**
  - **People are making video calls & watching films since data rates are cheapest in india**

6. Comments on IMP Survey Report by Public Affairs Committee

Public Affairs Index (PAI) rankings 2021: Kerala adjudged best governed state (06/11)

- In a diverse country like India, where each State is socially, culturally, economically, & politically distinct, measuring Governance becomes increasingly tricky.
- Public Affairs Index (PAI 2021) is a scientifically rigorous, data-based framework that measures the quality of governance at State level & ranks the States & UTs on a Composite Index (CI).
- States are classified into two categories: Large & Small, on population base.
- In PAI 2021, Public Affairs Committee (PAC) defined three significant pillars that embody Governance: Growth, Equity, & Sustainability.
- Each of the three Pillars is circumscribed by five governance praxis Themes that influence the pace & direction of development outcomes, in substantive & context-specific ways, in small or great measure.
  - The themes include: Voice & Accountability, Govt Effectiveness, Rule of Law, Regulatory Quality & Control of Corruption.
- At the bottom of the pyramid, 43 component indicators are mapped to 14 Sustainable Development Goals (SDGs) that are relevant to the States & UTs. This forms the foundation of conceptual framework of PAI 2021.
  - Choice of the 43 indicators that go into calculation of CI were dictated by the objective of uncovering complexity & multidimensional character of development

Detailed analysis was carried out on following parameters :

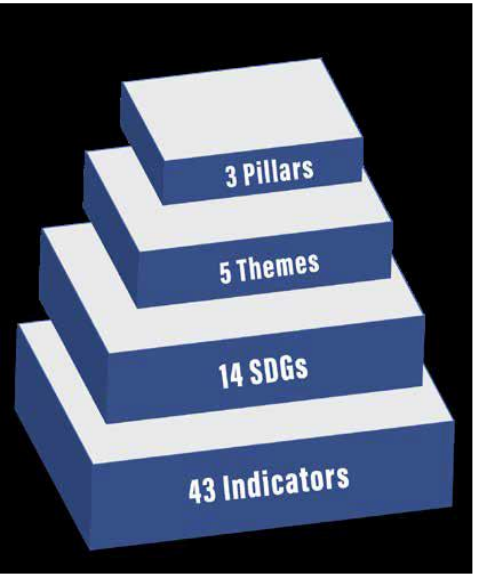
- The Equity Principle
- Growth & its Discontents
- The Pursuit Of Sustainability
- **The Curious Case Of The Delta**
- **In The Scheme of things :**
  - National Health Mission (NHM)
  - INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS)
  - MID- DAY MEAL SCHEME (MDMS)
  - SAMAGRA SHIKSHA ABHIYAN (SMSA)
  - MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE SCHEME (MGNREGS)
- COVID-19 Response Index
- The Epilogue: Cluster Analysis

The Equity Principle:

- Equity Pillar of the PAI 2021 Index analyses the inclusiveness impact at State level; inclusiveness in terms of welfare of a society that depends primarily on establishing that all people feel that they have a say in the governance & are not excluded from mainstream policy framework.
  - This requires all individuals & communities, but particularly the most vulnerable, to have an opportunity to improve or maintain their wellbeing.
- This reflects the performance of States & UTs during pandemic & questions the governance infrastructure, analysing the effectiveness of schemes & general livelihood of the people in terms of Equity.

Key Findings:

- In the Large States category GUJ ranks the highest in the Pillar of Equity, followed by Kerala & RAJ.
- RAJ is 3rd in the Pillar of Equity, it ranks 11th in the overall PAI 2021 Index.
- TN & Chhattisgarh are also among the good performing States in both Pillar of Equity & overall PAI Index; they have a rank of 2nd & 4th respectively in the PAI 2021 Index, & 5th and 4th in the Pillar of Equity
  - Among the poor performers in the Equity Pillar are the States of WB, Maha, KAR, Odisha & UP.



- KAR performs substantially well with a rank of 7th in the PAI 2021 Index, but 16th in the Pillar of Equity slipping four places compared to last year despite a positively moderate performance in the Pillars of Growth & Sustainability

- State performing consistently in the bottom over years under Equity Pillar in Large States category is UP, which places itself in the bottom of the rankings
- In the Small States category, Sikkim ranks 1st in the Equity Pillar as well as the overall Index, followed by Meghalaya ranking 2nd & Mizoram ranking 3rd.
- Similarly, Uttarakhand ranks 9th, Delhi 10th & Arunachal Pradesh 11th
  - Driver of Sikkim's performance is its ranking in the theme of Control of Corruption.
  - Delhi is also reflecting in its performance in the theme of Rule of Law where it has again come last
- A better livelihood, catering to better access to nutritional attainment for children can boost performance of the States/UTs.
  - Equity Pillar is proof of the fact that two-third of India's population which accounts for Women & Children need to be prioritised.

Growth & Disconnects:

- Growth in its multidimensional form encompasses the essence of access to & availability & optimal utilisation of resources (human resources, infrastructure & budgetary allocations).
  - Capacity building of an economy cannot take place if all the key players of growth do not drive development.
- Multiplier effects of better health care, improved educational outcomes, increased capital accumulation & lower unemployment levels contribute magnificently in the growth & development of the States.

The Pursuit Of Sustainability:

- Sustainability Pillar analyses the access to & usage of resources that has an impact on ENV, economy & humankind.
  - Pillar subsumes two themes & uses seven indicators to measure the effectiveness of ovt efforts with regards to Sustainability.

Curious Case Of The Delta:

- Delta Analysis presents the results on State performance on Y-O-Y improvement.
  - Rankings are measured as Delta value over last five to 10 years of data available for 12 Key Development Indicators (KDI).
- In PAI 2021, on 12 indicators across 3 Pillars of Equity (five indicators), Growth (five indicators) & Sustainability (two indicators), the Delta Analysis was carried out. Performance in Delta Analysis is then compared to the Overall PAI 2021 Index.

In the Scheme of Things:

- Scheme Analysis adds an additional dimension to ranking of States on their Governance. It attempts to complement Governance Model by trying to understand developmental activities undertaken by State Govts. It also tries to understand better performance of States in schemes which reflect in better governance. Following Centrally Sponsored schemes are analysed:
  - National Health Mission (NHM), / Integrated Child Development Services scheme (ICDS),
  - Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Samagra Shiksha Abhiyan (SmSA) & Mid- Day Meal Scheme (MDMS).
- The scheme analysis, (with an exception for the ICDS), has adopted a time-series based model using four years' data in the case of NHM and MDMS and five years' data in the case of MGNREGS & SmSA. Time series data has been compiled using the rolling median method.

COVID-19 Response Index:

- This Index is an attempt to rank Indian States on their response to the pandemic ever since the first case was detected in the country till March 31,2021. The index subsumes two thematic areas: Preparedness & Containment.
  - Pandemic Preparedness is a continuous process of planning, exercising, revising & translating into action National & State level pandemic preparedness & response plans whereas containment relies on strategies, aimed at detecting cases early by adopting suitable testing strategies, isolation of cases, contacts & providing adequate treatment.

The Epilogue : Cluster Analysis:

- PAI 2021 conducted a Cluster Analysis, an unsupervised Machine Learning technique to group data points depicting similar behaviour & uncover hidden patterns.
  - Agglomerative Hierarchical Clustering was applied on the 43 indicators of the PAI Governance Model to classify the Natural clusters among the States.
- Intent of this concluding chapter of PAI 2021 is to present a Cluster *Analysis of the performance of the States to highlight how important it is to focus attention on those States that are weighing down the National Aggregate performance & address the emerging gaps: Technical, Economic & Social.*

KEY Findings:

- First, the progress made by some States on some specific indicators has outpaced some of the high performing States.
  - In contrast some of the traditionally 'developed' States are showing signs of slowing down on some aspects of development
- Second, despite Aspirational Districts initiative, like in the previous years, the evidence that PAI 2021 generates points to persistent & structural inequality concentrated in certain geographies.
  - These populations must receive targeted & coherent policy attention & participatory, coordinated programmatic interventions

Equity Cluster:

- The 1st two Clusters are a mix of traditionally better performing & poor performing States in both the categories (Large States & Small States).
  - 3rd Equity Cluster incorporates States like Bihar, UP, Assam etc. which have ranked towards the bottom of the Equity Pillar in PAI 2021 Index. To not much surprise, two thirds of the Aspirational Districts are also mapped in this Cluster

Growth Cluster:

- 1st Cluster is an amalgamation of States that have shown improved performance in SDG 8 (under Regulatory Qulaity & SDG 9.
- 2nd Cluster dominated by the Large States comprises Ch'garh, GUJ, KAR, MP, Maha, Odisha, RAJ, TN, & TEL (also top & moderate performing under the Growth Pillar). This cluster can also be termed as 'the cluster of top performers'.
- The 3rd Cluster comprises Delhi, Goa, HAR, HP, Kerala, Manipur, Mizoram, Nagaland, PUN, Sikkim, U'khand & WB. This cluster is driven by SDGs 3, 4 and 7 (under Govt Effectiveness), & 8 (under Regulatory Quality)

Sustainability Cluster:

- The 1st Cluster essentially houses top & moderate performing Large States in the Sustainability Pillar with HP as an outlier addition from the Small States Category.
- The 2nd Cluster comprises States that show a mixed performance under the Sustainability Pillar.
- The 3rd Cluster comprises States that have been consistent poor performers in the Sustainability Pillar over the years- Bihar, Delhi, HAR, J'khand, PUN & UP.

Overall Composite Cluster

- 1st Cluster includes the Large States: Kerala, HAR, PUN & all Small States including Arunachal Pradesh, Delhi, Goa, HP, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura & U'khand. This cluster appears to be driven by the Growth Pillar where 10 out of 15 indicators are performing above National Average. In the Equity & Sustainability Pillar, .
- The 2nd Cluster includes Nine Large States: AP, Ch'garh, GUJ, KAR, MP, Maha, RAJ, TN & TEL This cluster is driven by its performance in the Sustainability Pillar where four out of seven indicators are performing above AVG.
- The 3rd Cluster consists of Assam, Bihar, J'khand, Odisha, UP & WB. This cluster is characterised by moderate performance in the Growth Pillar a& below-average performance in the Equity & Sustainability Pillars.
  - It is interesting to note that 57 out of the 112 districts which account for 50.8% of the total aspirational districts identified by NITI Aayog fall under the above six States under this cluster.

State wise PAI 2021 Indices:

Large States:

Kerala: 1.618/ TN: 0.897/ TEL: 0.891/ C'ghar: 0.892/ GUJ: 0782/ PUN: 0.643/ Kar: 0.121/ AP: 0.077

Jharkhand: (-.071)/ MP: (-0.113)/ RAJ: (-0. 243)/ MAHA: (-0.360)/ HAR: (-0.431)/ Assam: (-0.459)/ WB: (-0.553)/ Odisha: (-0.910)/ Bihar (-1.343), UP: (-1.418)

Small States:

Sikkim: 0.907/ Goa: 0.748/ Mizoram:0.659/ HP: 0.338

Tripura: (-0.009)/ Meghalaya: (-0.146)/ A'chal Pradesh: (-0.258)/ Nagaland: (-0.317)/ DEL: (-0.476)/ U'khand: (-0,543)/ Manipur: (-0.783)

Union Territories:

Puducherry: 1,345/ J&K: 0.396

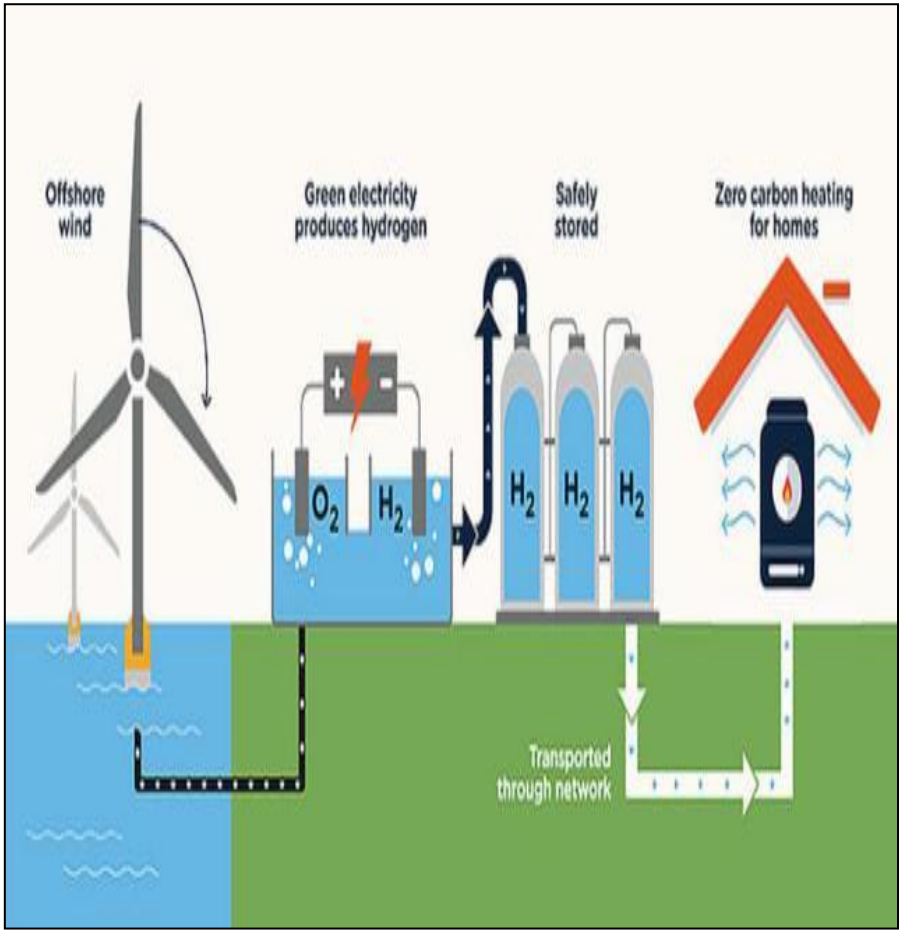
Chandigarh: (-0.298)/ Dadra NH: (-0.445), A&N Islands: (-0.696)

CONCLUSIONS:

- **Measuring governance is a challenge.** This issue becomes increasingly complex especially in diverse country like India, where each state is socially, culturally, economically & politically different.
- PAC thus identified three broad pillars namely **Growth, Equity & Sustainability that encapsulate governance**.
  - From a development perspective, it is axiomatic that there must be synergies between all the three pillars.
- It is impossible to believe that two of the three pillars are enough, i.e.
  - growth & sustainability without equity; growth & equity without sustainability; equity & sustainability without growth.
- PAI 2021 is an amalgamation of 3 Pillars, 5 Themes,14 SDGs and 43 indicators. PAI is a conscious effort to present a scientifically sound, methodologically rigorous, & practically useful data-based framework to measure the quality of governance in the States of India, & rank them

(Ref: Report from Public Affairs Centre, Bangaleru, on PAI 2021: 38 page Report released in Nov 2021)

7. Green Hydrogen: Future of Power Sector: news



Green H2 to boost India's Energy Security

India is anticipating that 80-85% its electricity Demd will be met from RES by 2050. India ranks 5th globally in installed solar capacity now. RES contribute over 25% of TTL IC & 11-12% in Energy terms

- **Climate change is a global phenomenon but with local consequences. Recent floods, earthquakes & erratic rainfall are evidence of unpredictable damages to human lives, businesses, private & public properties.**
  - **GOI has taken an ardent strategy to move away from dependence on fossil fuels to RES progressively.**
  - **Realising that H2 is the future fuel of world. GOI announced setting up of National Hydrogen Mission with the aim of India becoming the new global hub of H2 & also the largest exporter.**

Green H2 can help solve India's twin problems:

- **Energy Security & Decarbonisation of its economy.**
- **It can be produced thro' electrolysis of water using RE electricity to generate H2 & O2.**
- **Cost of Green H2 can be at parity with blue & grey H2 (produced from conventional Electricity sources) & will further reduce owing to increased scale, Demd & advancement of technology.**

- **To emerge as an exporter & global hub of Green H2, India needs to compete with H2 producers across Australia, the Middle East & South America.**
  - **For instance, Australia has 10% more solar irradiance, the Middle East has 20% more & South America has 30% more irradiance compared to India.**
  - **To become a global hub, we have to look at our tax structure, various logistic costs & all possible Regulations to make it so friendly that advantages of those countries in terms of higher irradiance can be compensated.**
- **Green H2 can be utilised not just for grid-scale Storage solutions & feedstock for ammonia but can play a bigger role in long-distance transportation.**
  - **Green H2 can substitute fossil fuels used in INDs including fertilisers, chemicals, petrochemicals, refineries & steel units.**
- **In India, a chunk of H2 is utilised in refining & production of ammonia, which is a base material for Urea & other complex fertilisers.**
  - **Currently, this H2 (GRAY) requirement is met from burning fossil fuels. Kick-starting a small share of Green H2 to substitute Grey H2 can create a substantial market.**
- **Need of the hour is a transparent mechanism of competitive bidding to arrive at lowest possible price of Green H2.**

Green Hydrogen Electrolysers:

- When electricity input to Electrolyser is obtained from wind/ solar, then H2 produced is called Green Hydrogen.
  - Typically, electrolysers consume 50-55 KWH of electricity to produce 1 KG H2. Electrolysers produce H2 at about 50-90 degree C & at a pressure of 30-50 bar. Electrolysers are commercially available at a size of a few KW to MW.

Electrolyser technologies available today:

- Alkaline Electrolysers (AE) & Polymer Electrolyte Membrane (PEM) electrolysers are commercially available technologies.
- Alkaline electrolysers use liquid alkaline electrolyte solution of Sodium or Potassium hydroxide while PEM electrolysers are based on solid polymer membrane.
- Solid Oxide electrolyser (SOE) is an upcoming technology that consumes less electricity than AE & PEM but is a costly option.
- In addition to these, Electrochemical, Thermally-Activated Chemical (E-TAC) & Anion Exchange Membrane (AEM) technologies claim to be more efficient than existing technology options.
  - Presently, Alkaline electrolysers have a 61% market share & is the most-widely used technology followed by PEM electrolysers having 31% market share. Remaining 8% is of Solid oxide electrolysers or unspecified technologies

- **Ohmium International, a US-based RE Co,** launched a Giga-factory for manufacturing **PEM electrolysers in India.**
- **Reliance has tied up with Stiesdal, a European Co**, to manufacture **Alkaline Electrolysers in India.**
  - Alkaline electrolysers have higher life, efficiency & **lower costs as compared PEM electrolysers.**
  - PEM electrolysers are **compact & have a lower area footprint** compared to alkaline electrolysers & are also **better equipped to handle variation in RE from Gen**
- **Electrolyser is the heart of the H2 production**.
  - Electrolysers today constitute about **33-57% cost of total H2 production. Rest is divided between RE & H2 storage units**
- Globally, industries have now set the **'1-1-1' target for Green H2.**
  - This implies **achieving a Green H2 cost of $1 per 1 KG in 1 decade**.
  - Price of green H2 today is $3.5 to $4.5 per kg.
  - For realising the '1-1-1' goal on green H2, it is estimated that:
  - **Cost of electrolyser has to reduce from $500 -700/KW today, to about $200/KW,**
  - **Electrolyser stack life has to double**
  - **Electrolyser efficiency has to go up to 80 % from 66.5% today.**

- **EU & the US are global leaders in PEM Electrolyser Technology,**
- **China is leader in Alkaline Electrolysers & is aggressively pursuing manufacturing of electrolysers to become an exporter for rapidly growing H2 economy in the World**

Where does India stands?

- **Alkaline electrolysers use chemicals like Potassium or Sodium hydroxide which are available in the market.**
- **However, PEM electrolysers need proprietary components like specialised membranes & access to critical minerals like iridium for developing the manufacturing ecosystem.**
  - **Indian research institutions have been working on developing indigenous electrolyser technologies. BARC has developed an Alkaline electrolyser while CSIR-CERI has developed PEM electrolysers.**
- **With announcements of electrolyser Giga-factories from private Cos & GOI's intention of making India as the manufacturing Hub, it is expected that India might also play a key role in production of Electrolysers.**
  - **India has the advantages of low manpower costs & access to its own large market. However, affordable finance, raw materials & technology needed for setting up manufacturing unit are the major challenges for India to become a global leader in this domain.**

Fortescue to build World's largest H2 hub:

- Australian Iron Ore Co. Fortescue Metals Group's Green energy arm is set to develop World's biggest equipment manufacturing hub for Green H2. The centre will start production by 2023. Initial capacity of electrolyser facility will be 2 GW/year which will be more than double the current production globally.

JCB signs multibillion-dollar deal to import Green Hydrogen:

- JCB, a UK-based construction equipment Co., has struck a massive deal with Australia's Fortescue Future Industries to import green H2. According to the agreement signed between FFI and JCB, and UK-based Ryze Hydrogen, JCB and Ryze will buy 10% of FFI's global green H2 output will also manage its distribution.

Indian Firms line-up for Green Hydrogen:

- Adani: 70% of Adani Group's planned CAPEX until 2030 will be in technologies, including investments in Electrolyzer manufacturing.
- GAIL (India) has plans to build India's largest Green H2 plant (10 MW capacity)
- Reliance IND plans to use 3 GW Solar power to produce green H2 in its electrolyser Giga-factory proposed to be set up at Jamnagar, GUJ
- L&T announced its plans for setting up a Green H2 plant in Hazira, GUJ, by end of FY22.

Big partnerships:

- Bill Gates has partnered with the UK Govt to invest $276 Mn in UK's clean energy technologies including green H2. The announcement was made at the Global Investment Summit.
- In another major partnership, QatarEnergy, Qatar's state-owned oil & gas company, & energy giant Shell teamed up to jointly invest in blue & green projects in the UK.
  - Enapter a Co. which designs & manufactures Anion Exchange Membrane electrolysers for green H2 has recently won the first-ever Earthshot Prize 2021, which will have an outsized impact in letting people know that modular Green H2 is a key solution for flipping Global Warming

Mississippi Clean Hydrogen Hub:

- Plans for a Mississippi clean H2 hub that is believed to be up to 10 times larger than any other green H2 project under construction in the US have been unveiled on 18th Oct 2021
- It is expected to produce approximately 110 Mn Kg Green H2 annually, together with its strategic partner Connor, Clark & Lunn Infrastructure, it will develop, commercialise & operate large-scale, long-duration H2 hubs in Mississippi.
  - It has already been confirmed that more than 70 Mn KG green H2 will be stored underground in salt caverns &, pending regulatory approvals & equipment availability, the hub's first phase is planned to enter commercial service by 2025.

India will require an estimated $15 billion in public & private funding to set up 15 GW of green H2 electrolyser capacity by 2030, according to India Hydrogen Alliance (IH2A).

- **This electrolyser capacity is expected to produce 3 MMT Green H2 & would need 30 GW RE. IH2A is an industry coalition of global & Indian firms committed to create a H2 value-chain & economy in India.**
  - **These findings were presented by the industry body in the first of a six-part consultation series organised by NITI Aayog & IND on green H2 demand in different sectors**

India, Italy announce green H2 collaboration:

- **India & Italy have agreed to explore development of Green H2 projects. Announcement was made on the side-lines of the G20 Summit held in Rome recently. Both countries agreed to initiate a dialogue to support development & deployment of green H2 & related technologies in India.**

Hon Gadkari calls for 'Greening' Cement, Steel Industries:

- **Roads & Highways Minister Nitin Gadkari in last week of Oct 21 said that now is the time for Cement & Steel IND to start using Green H2 instead of coal for energy needs.**
  - **He said that the focus should be on running metal industries on clean H2 to protect ENV as well as increase production.**

Thanks you! Be Happy & Stay Blessed!!

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